



SEQUENCE LISTING

<110> Wadhwa, Renu  
Sugihara, Takashi  
Ohide, Akiko

<120> TUMOR SUPPRESSOR GENE

<130> 06501-091001

<140> US 10/045,815  
<141> 2001-10-26

<150> PCT/JP00/02731  
<151> 2000-04-26

<150> JP 11/118806  
<151> 1999-04-26

<160> 15

<170> FastSEQ for Windows Version 4.0

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Val Arg Ala Leu Lys Leu Leu Thr Thr Leu Leu Ala Val Val Ala Ala  
5 10 15  
  
gcc tcc caa gcc gag gtc gag tcc gag gca gga tgg ggc atg gtg acg 153  
Ala Ser Gln Ala Glu Val Glu Ser Glu Ala Gly Trp Gly Met Val Thr  
20 25 30  
  
cct gat ctg ctc ttc gcc gag ggg acc gca gcc tac gcg cgc ggg gac 201  
Pro Asp Leu Leu Phe Ala Glu Gly Thr Ala Ala Tyr Ala Arg Gly Asp  
35 40 45 50  
  
tgg ccc ggg gtg gtc ctg agc atg gaa cgg gcg ctg cgc tcc cgg gca 249  
Trp Pro Gly Val Val Leu Ser Met Glu Arg Ala Leu Arg Ser Arg Ala  
55 60 65  
  
gcc ctc cgc gcc ctt cgc ctg cgc tgc cgc acc cag tgt gcc gcc gac 297  
Ala Leu Arg Ala Leu Arg Leu Arg Cys Arg Thr Gln Cys Ala Ala Asp  
70 75 80

|   |     |
|---|-----|
| ttc ccg tgg gag ctg gac ccc gac tgg tcc ccc agc ccg gcc cag gcc<br>Phe Pro Trp Glu Leu Asp Pro Asp Trp Ser Pro Ser Pro Ala Gln Ala<br>85 90 95        | 345 |
| tcg ggc gcc ggc gcc ctg cgc gac ctg agc ttc ttc ggg ggc ctt ctg<br>Ser Gly Ala Gly Ala Leu Arg Asp Leu Ser Phe Phe Gly Gly Leu Leu<br>100 105 110     | 393 |
| cgt cgc gct gcc tgc ctg cgc cgc tgc ctc ggg ccg ccg gcc gcc cac<br>Arg Arg Ala Ala Cys Leu Arg Arg Cys Leu Gly Pro Pro Ala Ala His<br>115 120 125 130 | 441 |
| tcg ctc agc gaa gag atg gag ctg gag ttc cgc aag cgg agc ccc tac<br>Ser Leu Ser Glu Glu Met Glu Leu Glu Phe Arg Lys Arg Ser Pro Tyr<br>135 140 145     | 489 |
| aac tac ctg cag gtc gcc tac ttc aag atc aac aag ttg gag aaa gct<br>Asn Tyr Leu Gln Val Ala Tyr Phe Lys Ile Asn Lys Leu Glu Lys Ala<br>150 155 160     | 537 |
| gtt gct gca gca cac acc ttc ttc gtg ggc aat cct gag cac atg gaa<br>Val Ala Ala Ala His Thr Phe Phe Val Gly Asn Pro Glu His Met Glu<br>165 170 175     | 585 |
| atg cag cag aac cta gac tat tac caa acc atg tct gga gtg aag gag<br>Met Gln Gln Asn Leu Asp Tyr Tyr Gln Thr Met Ser Gly Val Lys Glu<br>180 185 190     | 633 |
| gcc gac ttc aag gat ctt gag act caa ccc cat atg caa gaa ttt cga<br>Ala Asp Phe Lys Asp Leu Glu Thr Gln Pro His Met Gln Glu Phe Arg<br>195 200 205 210 | 681 |
| ctg gga gtg cga ctc tac tca gag gaa cag cca cag gaa gct gtg ccc<br>Leu Gly Val Arg Leu Tyr Ser Glu Glu Gln Pro Gln Glu Ala Val Pro<br>215 220 225     | 729 |
| cac cta gag gcg gcg ctg caa gaa tac ttt gtg gcc tat gag gag tgc<br>His Leu Glu Ala Ala Leu Gln Glu Tyr Phe Val Ala Tyr Glu Glu Cys<br>230 235 240     | 777 |
| cgt gcc ctc tgc gaa ggg ccc tat gac tac gat ggc tac aac tac ctt<br>Arg Ala Leu Cys Glu Gly Pro Tyr Asp Tyr Asp Gly Tyr Asn Tyr Leu<br>245 250 255     | 825 |
| gag tac aac gct gac ctc ttc cag gcc atc aca gat cat tac atc cag<br>Glu Tyr Asn Ala Asp Leu Phe Gln Ala Ile Thr Asp His Tyr Ile Gln<br>260 265 270     | 873 |
| gtc ctc aac tgt aag cag aac tgt gtc acg gag ctt gct tcc cac cca<br>Val Leu Asn Cys Lys Gln Asn Cys Val Thr Glu Leu Ala Ser His Pro<br>275 280 285 290 | 921 |
| agt cga gag aag ccc ttt gaa gac ttc ctc cca tcg cat tat aat tat<br>Ser Arg Glu Lys Pro Phe Glu Asp Phe Leu Pro Ser His Tyr Asn Tyr<br>295 300 305     | 969 |

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Val Thr Pro Asp Leu Leu Phe Ala Glu Gly Thr Ala Ala Tyr Ala Arg
 35          40          45

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|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Asp | Trp | Pro | Gly | Val | Val | Leu | Ser | Met | Glu | Arg | Ala | Leu | Arg | Ser |
| 50  |     |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Arg | Ala | Ala | Leu | Arg | Ala | Leu | Arg | Leu | Arg | Cys | Arg | Thr | Gln | Cys | Ala |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Ala | Asp | Phe | Pro | Trp | Glu | Leu | Asp | Pro | Asp | Trp | Ser | Pro | Ser | Pro | Ala |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Gln | Ala | Ser | Gly | Ala | Gly | Ala | Leu | Arg | Asp | Leu | Ser | Phe | Phe | Gly | Gly |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Leu | Leu | Arg | Arg | Ala | Ala | Cys | Leu | Arg | Arg | Cys | Leu | Gly | Pro | Pro | Ala |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Ala | His | Ser | Leu | Ser | Glu | Glu | Met | Glu | Leu | Glu | Phe | Arg | Lys | Arg | Ser |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Pro | Tyr | Asn | Tyr | Leu | Gln | Val | Ala | Tyr | Phe | Lys | Ile | Asn | Lys | Leu | Glu |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Lys | Ala | Val | Ala | Ala | Ala | His | Thr | Phe | Phe | Val | Gly | Asn | Pro | Glu | His |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |
| Met | Glu | Met | Gln | Gln | Asn | Leu | Asp | Tyr | Tyr | Gln | Thr | Met | Ser | Gly | Val |
|     |     | 180 |     |     |     |     | 185 |     |     |     |     |     | 190 |     |     |
| Lys | Glu | Ala | Asp | Phe | Lys | Asp | Leu | Glu | Thr | Gln | Pro | His | Met | Gln | Glu |
|     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Phe | Arg | Leu | Gly | Val | Arg | Leu | Tyr | Ser | Glu | Glu | Gln | Pro | Gln | Glu | Ala |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Val | Pro | His | Leu | Glu | Ala | Ala | Leu | Gln | Glu | Tyr | Phe | Val | Ala | Tyr | Glu |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Glu | Cys | Arg | Ala | Leu | Cys | Glu | Gly | Pro | Tyr | Asp | Tyr | Asp | Gly | Tyr | Asn |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Tyr | Leu | Glu | Tyr | Asn | Ala | Asp | Leu | Phe | Gln | Ala | Ile | Thr | Asp | His | Tyr |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Ile | Gln | Val | Leu | Asn | Cys | Lys | Gln | Asn | Cys | Val | Thr | Glu | Leu | Ala | Ser |
|     | 275 |     |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| His | Pro | Ser | Arg | Glu | Lys | Pro | Phe | Glu | Asp | Phe | Leu | Pro | Ser | His | Tyr |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Asn | Tyr | Leu | Gln | Phe | Ala | Tyr | Tyr | Asn | Ile | Gly | Asn | Tyr | Thr | Gln | Ala |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Gly | Glu | Cys | Ala | Lys | Thr | Tyr | Leu | Leu | Phe | Phe | Pro | Asn | Asp | Glu | Val |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Met | Asn | Gln | Asn | Leu | Ala | Tyr | Tyr | Ala | Ala | Met | Leu | Gly | Glu | Glu | His |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Thr | Arg | Ser | Ile | Gly | Pro | Arg | Glu | Gln | Gly | Thr |     |     |     |     |     |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     |     |     |     |     |

&lt;210&gt; 3

&lt;211&gt; 2600

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (52)...(2259)

&lt;400&gt; 3

ctccggcctt ggtggcgggt ggctggcgggt tccgttaggt ctgagggagc g atg gcg  
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57

gta cgc gcg ttg aag ctg ctg acc aca ctg ctg gct gtc gtg gcc gct  
Val Arg Ala Leu Lys Leu Leu Thr Thr Leu Leu Ala Val Val Ala Ala

105

| 5   | 10 | 15 |     |
|---|----|----|-----|
| gcc tcc caa gcc gag gtc gag tcc gag gca gga tgg ggc atg gtg acg<br>Ala Ser Gln Ala Glu Val Glu Ser Glu Ala Gly Trp Gly Met Val Thr<br>20 25 30        |    |    | 153 |
| cct gat ctg ctc ttc gcc gag ggg acc gca gcc tac gcg cgc ggg gac<br>Pro Asp Leu Leu Phe Ala Glu Gly Thr Ala Ala Tyr Ala Arg Gly Asp<br>35 40 45 50     |    |    | 201 |
| tgg ccc ggg gtg gtc ctg agc atg gaa cgg gcg ctg cgc tcc cgg gca<br>Trp Pro Gly Val Val Leu Ser Met Glu Arg Ala Leu Arg Ser Arg Ala<br>55 60 65        |    |    | 249 |
| gcc ctc cgc gcc ctt cgc ctg cgc tgc cgc acc cag tgt gcc gcc gac<br>Ala Leu Arg Ala Leu Arg Leu Arg Cys Arg Thr Gln Cys Ala Ala Asp<br>70 75 80        |    |    | 297 |
| ttc ccg tgg gag ctg gac ccc gac tgg tcc ccc agc ccg gcc cag gcc<br>Phe Pro Trp Glu Leu Asp Pro Asp Trp Ser Pro Ser Pro Ala Gln Ala<br>85 90 95        |    |    | 345 |
| tcg ggc gcc ggc gcc ctg cgc gac ctg agc ttc ttc ggg ggc ctt ctg<br>Ser Gly Ala Gly Ala Leu Arg Asp Leu Ser Phe Phe Gly Gly Leu Leu<br>100 105 110     |    |    | 393 |
| cgt cgc gct gcc tgc ctg cgc cgc tgc ctc ggg ccg ccg gcc gcc cac<br>Arg Arg Ala Ala Cys Leu Arg Arg Cys Leu Gly Pro Pro Ala Ala His<br>115 120 125 130 |    |    | 441 |
| tcg ctc agc gaa gag atg gag ctg gag ttc cgc aag cgg agc ccc tac<br>Ser Leu Ser Glu Glu Met Glu Leu Glu Phe Arg Lys Arg Ser Pro Tyr<br>135 140 145     |    |    | 489 |
| aac tac ctg cag gtc gcc tac ttc aag atc aac aag ttg gag aaa gct<br>Asn Tyr Leu Gln Val Ala Tyr Phe Lys Ile Asn Lys Leu Glu Lys Ala<br>150 155 160     |    |    | 537 |
| gtt gct gca gca cac acc ttc ttc gtg ggc aat cct gag cac atg gaa<br>Val Ala Ala Ala His Thr Phe Phe Val Gly Asn Pro Glu His Met Glu<br>165 170 175     |    |    | 585 |
| atg cag cag aac cta gac tat tac caa acc atg tct gga gtg aag gag<br>Met Gln Gln Asn Leu Asp Tyr Tyr Gln Thr Met Ser Gly Val Lys Glu<br>180 185 190     |    |    | 633 |
| gcc gac ttc aag gat ctt gag act caa ccc cat atg caa gaa ttt cga<br>Ala Asp Phe Lys Asp Leu Glu Thr Gln Pro His Met Gln Glu Phe Arg<br>195 200 205 210 |    |    | 681 |
| ctg gga gtg cga ctc tac tca gag gaa cag cca cag gaa gct gtg ccc<br>Leu Gly Val Arg Leu Tyr Ser Glu Glu Gln Pro Gln Glu Ala Val Pro<br>215 220 225     |    |    | 729 |
| cac cta gag gcg gcg ctg caa gaa tac ttt gtg gcc tat gag gag tgc<br>His Leu Glu Ala Ala Leu Gln Glu Tyr Phe Val Ala Tyr Glu Glu Cys<br>230 235 240     |    |    | 777 |

|   |      |
|---|------|
| cgt gcc ctc tgc gaa ggg ccc tat gac tac gat ggc tac aac tac ctt<br>Arg Ala Leu Cys Glu Gly Pro Tyr Asp Tyr Asp Gly Tyr Asn Tyr Leu<br>245 250 255     | 825  |
| gag tac aac gct gac ctc ttc cag gcc atc aca gat cat tac atc cag<br>Glu Tyr Asn Ala Asp Leu Phe Gln Ala Ile Thr Asp His Tyr Ile Gln<br>260 265 270     | 873  |
| gtc ctc aac tgt aag cag aac tgt gtc acg gag ctt gct tcc cac cca<br>Val Leu Asn Cys Lys Gln Asn Cys Val Thr Glu Leu Ala Ser His Pro<br>275 280 285 290 | 921  |
| agt cga gag aag ccc ttt gaa gac ttc ctc cca tcg cat tat aat tat<br>Ser Arg Glu Lys Pro Phe Glu Asp Phe Leu Pro Ser His Tyr Asn Tyr<br>295 300 305     | 969  |
| ctg cag ttt gcc tac tat aac att ggg aat tat aca caa gct ggt gaa<br>Leu Gln Phe Ala Tyr Tyr Asn Ile Gly Asn Tyr Thr Gln Ala Gly Glu<br>310 315 320     | 1017 |
| tgt gcc aag acc tat ctt ctc ttc ttc ccc aat gac gag gtg atg aac<br>Cys Ala Lys Thr Tyr Leu Leu Phe Phe Pro Asn Asp Glu Val Met Asn<br>325 330 335     | 1065 |
| caa aat ttg gcc tat tat gca gct atg ctt gga gaa gaa cac acc aga<br>Gln Asn Leu Ala Tyr Tyr Ala Ala Met Leu Gly Glu Glu His Thr Arg<br>340 345 350     | 1113 |
| tcc atc ggc ccc cgt gag agt gcc aag gag tac cga cag cga agc cta<br>Ser Ile Gly Pro Arg Glu Ser Ala Lys Glu Tyr Arg Gln Arg Ser Leu<br>355 360 365 370 | 1161 |
| ctg gaa aaa gaa ctg ctt ttc ttc gct tat gat gtt ttt gga att ccc<br>Leu Glu Lys Glu Leu Leu Phe Phe Ala Tyr Asp Val Phe Gly Ile Pro<br>375 380 385     | 1209 |
| ttt gtg gat ccg gat tca tgg act cca gaa gaa gtg att ccc aag aga<br>Phe Val Asp Pro Asp Ser Trp Thr Pro Glu Glu Val Ile Pro Lys Arg<br>390 395 400     | 1257 |
| ttg caa gag aaa cag aag tca gaa cgg gaa aca gcc gta cgc atc tcc<br>Leu Gln Glu Lys Gln Lys Ser Glu Arg Glu Thr Ala Val Arg Ile Ser<br>405 410 415     | 1305 |
| cag gag att ggg aac ctt atg aag gaa atc gag acc ctt gtg gaa gag<br>Gln Glu Ile Gly Asn Leu Met Lys Glu Ile Glu Thr Leu Val Glu Glu<br>420 425 430     | 1353 |
| aag acc aag gag tca ctg gat gtg agc aga ctg acc cgg gaa ggt ggc<br>Lys Thr Lys Glu Ser Leu Asp Val Ser Arg Leu Thr Arg Glu Gly Gly<br>435 440 445 450 | 1401 |
| ccc ctg ctg tat gaa ggc atc agt ctc acc atg aac tcc aaa ctc ctg<br>Pro Leu Leu Tyr Glu Gly Ile Ser Leu Thr Met Asn Ser Lys Leu Leu<br>455 460 465     | 1449 |

|   |      |
|---|------|
| aat ggt tac cag cgg gtg gtg atg gac ggc gta atc tct gac cac gag | 1497 |
| Asn Gly Tyr Gln Arg Val Val Met Asp Gly Val Ile Ser Asp His Glu |      |
| 470 475 480   |      |
| tgt cag gag ctg cag aga ctg acc aat gtg gca gca acc tca gga gat | 1545 |
| Cys Gln Glu Leu Gln Arg Leu Thr Asn Val Ala Ala Thr Ser Gly Asp |      |
| 485 490 495   |      |
| ggc tac cgg ggt cag acc tcc cca cat act ccc aat gaa aag ttc tat | 1593 |
| Gly Tyr Arg Gly Gln Thr Ser Pro His Thr Pro Asn Glu Lys Phe Tyr |      |
| 500 505 510   |      |
| ggt gtc act gtc ttc aaa gcc ctc aag ctg ggg caa gaa ggc aaa gtt | 1641 |
| Gly Val Thr Val Phe Lys Ala Leu Lys Leu Gly Gln Glu Gly Lys Val |      |
| 515 520 525 530   |      |
| cct ctg cag agt gcc cac ctg tac tac aac gtg acg gag aaa gtg cgg | 1689 |
| Pro Leu Gln Ser Ala His Leu Tyr Tyr Asn Val Thr Glu Lys Val Arg |      |
| 535 540 545   |      |
| cgc atc atg gag tcc tac ttc cgc ctg gat acg ccc ctc tac ttt tcc | 1737 |
| Arg Ile Met Glu Ser Tyr Phe Arg Leu Asp Thr Pro Leu Tyr Phe Ser |      |
| 550 555 560   |      |
| tac tct cat ctg gtg tgc cgc act gcc atc gaa gag gtc cag gca gag | 1785 |
| Tyr Ser His Leu Val Cys Arg Thr Ala Ile Glu Glu Val Gln Ala Glu |      |
| 565 570 575   |      |
| agg aag gat gat agt cat cca gtc cac gtg gac aac tgc atc ctg aat | 1833 |
| Arg Lys Asp Asp Ser His Pro Val His Val Asp Asn Cys Ile Leu Asn |      |
| 580 585 590   |      |
| gcc gag acc ctc gtg tgt gtc aaa gag ccc cca gcc tac acc ttc cgc | 1881 |
| Ala Glu Thr Leu Val Cys Val Lys Glu Pro Pro Ala Tyr Thr Phe Arg |      |
| 595 600 605 610   |      |
| gac tac agc gcc atc ctt tac cta aat ggg gac ttc gat ggc gga aac | 1929 |
| Asp Tyr Ser Ala Ile Leu Tyr Leu Asn Gly Asp Phe Asp Gly Gly Asn |      |
| 615 620 625   |      |
| ttt tat ttc act gaa ctg gat gcc aag acc gtg acg gca gag gtg cag | 1977 |
| Phe Tyr Phe Thr Glu Leu Asp Ala Lys Thr Val Thr Ala Glu Val Gln |      |
| 630 635 640   |      |
| cct cag tgt gga aga gcc gtg gga ttc tct tca ggc act gaa aac cca | 2025 |
| Pro Gln Cys Gly Arg Ala Val Gly Phe Ser Ser Gly Thr Glu Asn Pro |      |
| 645 650 655   |      |
| cat gga gtg aag gct gtc acc agg ggg cag cgc tgt gcc atc gcc ctg | 2073 |
| His Gly Val Lys Ala Val Thr Arg Gly Gln Arg Cys Ala Ile Ala Leu |      |
| 660 665 670   |      |
| tgg ttc acc ctg gac cct cga cac agc gag cgg gac agg gtg cag gca | 2121 |
| Trp Phe Thr Leu Asp Pro Arg His Ser Glu Arg Asp Arg Val Gln Ala |      |
| 675 680 685 690   |      |
| gat gac ctg gtg aag atg ctc ttc agc cca gaa gag atg gac ctc tcc | 2169 |

|            |            |            |            |            |            |     |     |     |     |     |     |     |     |     |     |  |      |
|------------|------------|------------|------------|------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|------|
| Asp        | Asp        | Leu        | Val        | Lys        | Met        | Leu | Phe | Ser | Pro | Glu | Glu | Met | Asp | Leu | Ser |  |      |
|            |            |            |            | 695        |            |     |     |     | 700 |     |     |     |     | 705 |     |  |      |
| cag        | gag        | cag        | ccc        | ctg        | gat        | gcc | cag | cag | ggc | ccc | ccc | gaa | cct | gca | caa |  | 2217 |
| Gln        | Glu        | Gln        | Pro        | Leu        | Asp        | Ala | Gln | Gln | Gly | Pro | Pro | Glu | Pro | Ala | Gln |  |      |
|            |            |            | 710        |            |            |     |     | 715 |     |     |     |     | 720 |     |     |  |      |
| gag        | tct        | ctc        | tca        | ggc        | agt        | gaa | tcg | aag | ccc | aag | gat | gag | cta |     |     |  | 2259 |
| Glu        | Ser        | Leu        | Ser        | Gly        | Ser        | Glu | Ser | Lys | Pro | Lys | Asp | Glu | Leu |     |     |  |      |
|            |            |            | 725        |            |            |     | 730 |     |     |     |     | 735 |     |     |     |  |      |
| tgacagcgtc | caggtcagac | ggatgggtga | ctagacccat | gaagaggaac | tcttcttgca |     |     |     |     |     |     |     |     |     |     |  | 2319 |
| ctctgagctg | gccagcccct | cggggctgca | gagcagtgag | cctacatctg | ccactcagcc |     |     |     |     |     |     |     |     |     |     |  | 2379 |
| gaggggaccc | tgctcacagc | cttctacatg | gtgctactgc | tcttggagtg | gacatgacca |     |     |     |     |     |     |     |     |     |     |  | 2439 |
| gacaccgcac | cccctggatc | tggctgaggg | ctcaggacac | aggcccagcc | acccccaggg |     |     |     |     |     |     |     |     |     |     |  | 2499 |
| gcctccacag | gccgctgcat | aacagcgata | cagtacttaa | gtgtctgtgt | agacaaccaa |     |     |     |     |     |     |     |     |     |     |  | 2559 |
| agaataaatg | attcatgggt | ttttttaaaa | aaaaaaaaaa | a          |            |     |     |     |     |     |     |     |     |     |     |  | 2600 |

&lt;210&gt; 4

&lt;211&gt; 736

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 4

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Met | Ala | Val | Arg | Ala | Leu | Lys | Leu | Leu | Thr | Thr | Leu | Leu | Ala | Val | Val |  |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |  |
| Ala | Ala | Ala | Ser | Gln | Ala | Glu | Val | Glu | Ser | Glu | Ala | Gly | Trp | Gly | Met |  |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |  |
| Val | Thr | Pro | Asp | Leu | Leu | Phe | Ala | Glu | Gly | Thr | Ala | Ala | Tyr | Ala | Arg |  |  |
|     |     | 35  |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |  |  |
| Gly | Asp | Trp | Pro | Gly | Val | Val | Leu | Ser | Met | Glu | Arg | Ala | Leu | Arg | Ser |  |  |
|     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |  |  |
| Arg | Ala | Ala | Leu | Arg | Ala | Leu | Arg | Leu | Arg | Cys | Arg | Thr | Gln | Cys | Ala |  |  |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |  |  |
| Ala | Asp | Phe | Pro | Trp | Glu | Leu | Asp | Pro | Asp | Trp | Ser | Pro | Ser | Pro | Ala |  |  |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |  |  |
| Gln | Ala | Ser | Gly | Ala | Gly | Ala | Leu | Arg | Asp | Leu | Ser | Phe | Phe | Gly | Gly |  |  |
|     |     |     | 100 |     |     |     | 105 |     |     |     |     |     | 110 |     |     |  |  |
| Leu | Leu | Arg | Arg | Ala | Ala | Cys | Leu | Arg | Arg | Cys | Leu | Gly | Pro | Pro | Ala |  |  |
|     |     | 115 |     |     |     | 120 |     |     |     |     |     | 125 |     |     |     |  |  |
| Ala | His | Ser | Leu | Ser | Glu | Glu | Met | Glu | Leu | Glu | Phe | Arg | Lys | Arg | Ser |  |  |
|     | 130 |     |     |     | 135 |     |     |     |     |     | 140 |     |     |     |     |  |  |
| Pro | Tyr | Asn | Tyr | Leu | Gln | Val | Ala | Tyr | Phe | Lys | Ile | Asn | Lys | Leu | Glu |  |  |
| 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     | 160 |     |  |  |
| Lys | Ala | Val | Ala | Ala | Ala | His | Thr | Phe | Phe | Val | Gly | Asn | Pro | Glu | His |  |  |
|     |     |     | 165 |     |     |     | 170 |     |     |     |     |     |     | 175 |     |  |  |
| Met | Glu | Met | Gln | Gln | Asn | Leu | Asp | Tyr | Tyr | Gln | Thr | Met | Ser | Gly | Val |  |  |
|     |     | 180 |     |     |     |     | 185 |     |     |     |     |     | 190 |     |     |  |  |
| Lys | Glu | Ala | Asp | Phe | Lys | Asp | Leu | Glu | Thr | Gln | Pro | His | Met | Gln | Glu |  |  |
|     | 195 |     |     |     | 200 |     |     |     |     |     |     | 205 |     |     |     |  |  |
| Phe | Arg | Leu | Gly | Val | Arg | Leu | Tyr | Ser | Glu | Glu | Gln | Pro | Gln | Glu | Ala |  |  |
|     | 210 |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |     |  |  |
| Val | Pro | His | Leu | Glu | Ala | Ala | Leu | Gln | Glu | Tyr | Phe | Val | Ala | Tyr | Glu |  |  |
| 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |  |  |
| Glu | Cys | Arg | Ala | Leu | Cys | Glu | Gly | Pro | Tyr | Asp | Tyr | Asp | Gly | Tyr | Asn |  |  |
|     |     |     | 245 |     |     |     | 250 |     |     |     |     |     | 255 |     |     |  |  |
| Tyr | Leu | Glu | Tyr | Asn | Ala | Asp | Leu | Phe | Gln | Ala | Ile | Thr | Asp | His | Tyr |  |  |



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Ile | Gln | Val | Leu | Asn | Cys | Lys | Gln | Asn | Cys | Val | Thr | Glu | Leu | Ala | Ser |  |
|     |     | 275 |     |     |     |     |     | 280 |     |     |     | 285 |     |     |     |  |
| His | Pro | Ser | Arg | Glu | Lys | Pro | Phe | Glu | Asp | Phe | Leu | Pro | Ser | His | Tyr |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |
| Asn | Tyr | Leu | Gln | Phe | Ala | Tyr | Tyr | Asn | Ile | Gly | Asn | Tyr | Thr | Gln | Ala |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |  |
| Gly | Glu | Cys | Ala | Lys | Thr | Tyr | Leu | Leu | Phe | Phe | Pro | Asn | Asp | Glu | Val |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |  |
| Met | Asn | Gln | Asn | Leu | Ala | Tyr | Tyr | Ala | Ala | Met | Leu | Gly | Glu | Glu | His |  |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |  |
| Thr | Arg | Ser | Ile | Gly | Pro | Arg | Glu | Ser | Ala | Lys | Glu | Tyr | Arg | Gln | Arg |  |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |  |
| Ser | Leu | Leu | Glu | Lys | Glu | Leu | Leu | Phe | Phe | Ala | Tyr | Asp | Val | Phe | Gly |  |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |  |
| Ile | Pro | Phe | Val | Asp | Pro | Asp | Ser | Trp | Thr | Pro | Glu | Glu | Val | Ile | Pro |  |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |  |
| Lys | Arg | Leu | Gln | Glu | Lys | Gln | Lys | Ser | Glu | Arg | Glu | Thr | Ala | Val | Arg |  |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |  |
| Ile | Ser | Gln | Glu | Ile | Gly | Asn | Leu | Met | Lys | Glu | Ile | Glu | Thr | Leu | Val |  |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |  |
| Glu | Glu | Lys | Thr | Lys | Glu | Ser | Leu | Asp | Val | Ser | Arg | Leu | Thr | Arg | Glu |  |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |  |
| Gly | Gly | Pro | Leu | Leu | Tyr | Glu | Gly | Ile | Ser | Leu | Thr | Met | Asn | Ser | Lys |  |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |  |
| Leu | Leu | Asn | Gly | Tyr | Gln | Arg | Val | Val | Met | Asp | Gly | Val | Ile | Ser | Asp |  |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |  |
| His | Glu | Cys | Gln | Glu | Leu | Gln | Arg | Leu | Thr | Asn | Val | Ala | Ala | Thr | Ser |  |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |  |
| Gly | Asp | Gly | Tyr | Arg | Gly | Gln | Thr | Ser | Pro | His | Thr | Pro | Asn | Glu | Lys |  |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |  |
| Phe | Tyr | Gly | Val | Thr | Val | Phe | Lys | Ala | Leu | Lys | Leu | Gly | Gln | Glu | Gly |  |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |  |
| Lys | Val | Pro | Leu | Gln | Ser | Ala | His | Leu | Tyr | Tyr | Asn | Val | Thr | Glu | Lys |  |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |  |
| Val | Arg | Arg | Ile | Met | Glu | Ser | Tyr | Phe | Arg | Leu | Asp | Thr | Pro | Leu | Tyr |  |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |  |
| Phe | Ser | Tyr | Ser | His | Leu | Val | Cys | Arg | Thr | Ala | Ile | Glu | Glu | Val | Gln |  |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |  |
| Ala | Glu | Arg | Lys | Asp | Asp | Ser | His | Pro | Val | His | Val | Asp | Asn | Cys | Ile |  |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |  |
| Leu | Asn | Ala | Glu | Thr | Leu | Val | Cys | Val | Lys | Glu | Pro | Pro | Ala | Tyr | Thr |  |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 6   |     |     |     |  |

```
<220>  
<221> CDS  
<222> (12) ... (2252)
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|            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <400> 5    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| ggagcaaggc | c   | atg | gcg | gtg | acg | aaa | gga | ggc | tgc | tgg | cac | gat | gct | agc | 50  |     |
|            |     | Met | Ala | Val | Thr | Lys | Gly | Gly | Cys | Trp | His | Asp | Ala | Ser |     |     |
|            |     | 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     |     |
| ggt        | cgc | cgc | cgc | cgc | cgc | ctt | acg | ggt | tgc | ggc | gag | tct | gag | ccg | gga | 98  |
| Gly        | Arg | Arg | Arg | Arg | Arg | Leu | Thr | Gly | Cys | Gly | Glu | Ser | Glu | Pro | Gly |     |
|            | 15  |     |     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     |
| tgg        | gac | gtg | gca | gcc | cct | gac | ctg | ctt | tac | gca | gag | ggg | acc | gcg | gcc | 146 |
| Trp        | Asp | Val | Ala | Ala | Pro | Asp | Leu | Leu | Tyr | Ala | Glu | Gly | Thr | Ala | Ala |     |
|            | 30  |     |     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |
| tac        | tcg | cgc | agg | gac | tgg | ccc | ggg | gtg | gtc | ctg | aac | atg | gag | cgg | gct | 194 |
| Tyr        | Ser | Arg | Arg | Asp | Trp | Pro | Gly | Val | Val | Leu | Asn | Met | Glu | Arg | Ala |     |
|            |     |     |     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |
| ctg        | cgc | tcg | cgg | gcg | gcc | ctg | cgt | gcc | ctc | cgc | ctg | cgc | tgc | cgc | aca | 242 |
| Leu        | Arg | Ser | Arg | Ala | Ala | Leu | Arg | Ala | Leu | Arg | Leu | Arg | Cys | Arg | Thr |     |
|            |     |     | 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |
| cgc        | tgt | gcc | acc | gaa | ctg | ccg | tgg | gca | ccg | gac | ctg | gat | ctc | ggt | ccg | 290 |
| Arg        | Cys | Ala | Thr | Glu | Leu | Pro | Trp | Ala | Pro | Asp | Leu | Asp | Leu | Gly | Pro |     |
|            |     | 80  |     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |
| gac        | ccc | agc | ctg | agc | cag | gac | ccg | ggc | gcc | gcc | gcc | ctg | cac | gac | ctg | 338 |
| Asp        | Pro | Ser | Leu | Ser | Gln | Asp | Pro | Gly | Ala | Ala | Ala | Leu | His | Asp | Leu |     |
|            | 95  |     |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     |     |
| cgc        | ttc | ttc | gga | gcc | gtg | ctg | cgc | cgt | gcc | gcc | tgc | cta | cgc | cgc | tgc | 386 |
| Arg        | Phe | Phe | Gly | Ala | Val | Leu | Arg | Arg | Ala | Ala | Cys | Leu | Arg | Arg | Cys |     |
| 110        |     |     |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |
| ctc        | ggg | ccg | ccc | tct | gcc | cac | ttg | ctg | agt | gaa | gaa | ctg | gac | ctg | gag | 434 |
| Leu        | Gly | Pro | Pro | Ser | Ala | His | Leu | Leu | Ser | Glu | Glu | Leu | Asp | Leu | Glu |     |
|            |     |     |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |
| ttc        | aac | aag | cgg | agc | ccg | tac | aac | tac | ctg | cag | gtc | gcc | tat | ttc | aag | 482 |
| Phe        | Asn | Lys | Arg | Ser | Pro | Tyr | Asn | Tyr | Leu | Gln | Val | Ala | Tyr | Phe | Lys |     |
|            |     |     | 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |

|   |      |
|---|------|
| ata aac aag ctg gag aaa gct gtg gct gcg gca cac acc ttc ttt gtg<br>Ile Asn Lys Leu Glu Lys Ala Val Ala Ala Ala His Thr Phe Phe Val<br>160 165 170     | 530  |
| ggc aat cct gag cac atg gag atg cgg cag aac ctc gac tat tac caa<br>Gly Asn Pro Glu His Met Glu Met Arg Gln Asn Leu Asp Tyr Tyr Gln<br>175 180 185     | 578  |
| acc atg tct ggg gtg aag gag gca gac ttc agg gat ctc gag gcc aag<br>Thr Met Ser Gly Val Lys Glu Ala Asp Phe Arg Asp Leu Glu Ala Lys<br>190 195 200 205 | 626  |
| ccc cat atg cat gag ttt cgg ctg ggg gta cga ctc tac tca gag gag<br>Pro His Met His Glu Phe Arg Leu Gly Val Arg Leu Tyr Ser Glu Glu<br>210 215 220     | 674  |
| aag cca cag gaa gct gtg ccc cac ctg gag gcg gca ctg caa gag tac<br>Lys Pro Gln Glu Ala Val Pro His Leu Glu Ala Ala Leu Gln Glu Tyr<br>225 230 235     | 722  |
| ttt gtg gcc gat gag gag tgc cgt gcc ctc tgc gaa ggg ccc tat gac<br>Phe Val Ala Asp Glu Glu Cys Arg Ala Leu Cys Glu Gly Pro Tyr Asp<br>240 245 250     | 770  |
| tac gac ggc tac aac tac cta gac tac agc gct gac ctc ttc cag gcc<br>Tyr Asp Gly Tyr Asn Tyr Leu Asp Tyr Ser Ala Asp Leu Phe Gln Ala<br>255 260 265     | 818  |
| atc aca gat cat tac gtc cag gtc ctc aac tgt aag cag aac tgt gtc<br>Ile Thr Asp His Tyr Val Gln Val Leu Asn Cys Lys Gln Asn Cys Val<br>270 275 280 285 | 866  |
| acg gag ctg gct tcc cac cca agt agg gaa aag ccc ttt gaa gac ttc<br>Thr Glu Leu Ala Ser His Pro Ser Arg Glu Lys Pro Phe Glu Asp Phe<br>290 295 300     | 914  |
| ctc cct tca cac tat aat tac cta cag ttt gcc tac tac aac att ggg<br>Leu Pro Ser His Tyr Asn Tyr Leu Gln Phe Ala Tyr Tyr Asn Ile Gly<br>305 310 315     | 962  |
| aac tat aca caa gct att gaa tgt gcc aag acc tac ctc ctc ttc ttt<br>Asn Tyr Thr Gln Ala Ile Glu Cys Ala Lys Thr Tyr Leu Leu Phe Phe<br>320 325 330     | 1010 |
| ccc aat gat gag gtg atg cac cag aat ctg gct tat tac aca gcc atg<br>Pro Asn Asp Glu Val Met His Gln Asn Leu Ala Tyr Tyr Thr Ala Met<br>335 340 345     | 1058 |
| ctt gga gaa gaa gag gcc agc tcc atc agc ccc agg gag aat gcc gag<br>Leu Gly Glu Glu Glu Ala Ser Ser Ile Ser Pro Arg Glu Asn Ala Glu<br>350 355 360 365 | 1106 |
| gaa tac cga cgt cca aac ctg ttg gag aaa gaa ctg ctt ttc ttc gct<br>Glu Tyr Arg Arg Pro Asn Leu Leu Glu Lys Glu Leu Leu Phe Phe Ala<br>370 375 380     | 1154 |
| tat gac att ttt gga att ccc ttt gtg gat ccc gat tca tgg act cca   | 1202 |

|   |      |
|---|------|
| Tyr Asp Ile Phe Gly Ile Pro Phe Val Asp Pro Asp Ser Trp Thr Pro |      |
| 385 390 395   |      |
| gaa gaa gtg att ccc aag aga ttg caa gag aaa cag aag tct gaa cgg | 1250 |
| Glu Glu Val Ile Pro Lys Arg Leu Gln Glu Lys Gln Lys Ser Glu Arg |      |
| 400 405 410   |      |
| gaa aca gcc gta cgc atc tcc cag gag att ggg aac ctt atg aag gaa | 1298 |
| Glu Thr Ala Val Arg Ile Ser Gln Glu Ile Gly Asn Leu Met Lys Glu |      |
| 415 420 425   |      |
| atc gag acc ctt gtg gaa gag aag acc aag gag tct ctg gat gtg agc | 1346 |
| Ile Glu Thr Leu Val Glu Glu Lys Thr Lys Glu Ser Leu Asp Val Ser |      |
| 430 435 440 445   |      |
| aga ctg acc cgg gaa ggt ggt ccc ctg ctg tat gaa ggc atc agt ctc | 1394 |
| Arg Leu Thr Arg Glu Gly Gly Pro Leu Leu Tyr Glu Gly Ile Ser Leu |      |
| 450 455 460   |      |
| acc atg aac tcc aaa gtc ttg aat ggc tcc cag cgg gtg gtg atg gat | 1442 |
| Thr Met Asn Ser Lys Val Leu Asn Gly Ser Gln Arg Val Val Met Asp |      |
| 465 470 475   |      |
| ggt gtg atc tct gat gat gag tgc cag gag ctg cag aga ctg acc aat | 1490 |
| Gly Val Ile Ser Asp Asp Glu Cys Gln Glu Leu Gln Arg Leu Thr Asn |      |
| 480 485 490   |      |
| gcg gca gca act tcg gga gat ggc tac cga ggt cag acc tcc cca cac | 1538 |
| Ala Ala Ala Thr Ser Gly Asp Gly Tyr Arg Gly Gln Thr Ser Pro His |      |
| 495 500 505   |      |
| acc cca aat gaa aag ttc tat ggt gtt act gtc ctc aaa gct ctc aag | 1586 |
| Thr Pro Asn Glu Lys Phe Tyr Gly Val Thr Val Leu Lys Ala Leu Lys |      |
| 510 515 520 525   |      |
| ctc ggg cag gaa gga aaa gtt cct ctg cag agt gcc cgc atg tac tac | 1634 |
| Leu Gly Gln Glu Gly Lys Val Pro Leu Gln Ser Ala Arg Met Tyr Tyr |      |
| 530 535 540   |      |
| aac gtg aca gag aag gtg cgg cgc gtc atg gag tcc tac ttc cgc ctg | 1682 |
| Asn Val Thr Glu Lys Val Arg Arg Val Met Glu Ser Tyr Phe Arg Leu |      |
| 545 550 555   |      |
| gac acg ccc ctc tat ttc tct tat tcc cac ttc gtg tgc cgc act gca | 1730 |
| Asp Thr Pro Leu Tyr Phe Ser Tyr Ser His Phe Val Cys Arg Thr Ala |      |
| 560 565 570   |      |
| ata gaa gag tca cag gct gag agg aag gac agt agc cac ccc gtc cac | 1778 |
| Ile Glu Glu Ser Gln Ala Glu Arg Lys Asp Ser Ser His Pro Val His |      |
| 575 580 585   |      |
| gtg gat aac tgc atc ctg aat gcc gaa gcc ttc atg tgt atc aag gag | 1826 |
| Val Asp Asn Cys Ile Leu Asn Ala Glu Ala Phe Met Cys Ile Lys Glu |      |
| 590 595 600 605   |      |
| ccc cca gca tac acg ttc cgg gaa tac agc gcc atc ctt tac ctc aat | 1874 |
| Pro Pro Ala Tyr Thr Phe Arg Glu Tyr Ser Ala Ile Leu Tyr Leu Asn |      |

| 610  | 615 | 620 |                      |
|--|-----|-----|----------------------|
| ggc gac ttc gat gga gga aac ttt tac ttc aca gaa cta gat gcc aag<br>Gly Asp Phe Asp Gly Gly Asn Phe Tyr Phe Thr Glu Leu Asp Ala Lys<br>625 630 635  |     |     | 1922                 |
| act gtg acg gca gag gtg cag ccc cag tgt gga agg gct gtg gga ttc<br>Thr Val Thr Ala Glu Val Gln Pro Gln Cys Gly Arg Ala Val Gly Phe<br>640 645 650  |     |     | 1970                 |
| tct tct ggc act gag aac cca cat gga gtg aag gct gtc acc agg ggg<br>Ser Ser Gly Thr Glu Asn Pro His Gly Val Lys Ala Val Thr Arg Gly<br>655 660 665  |     |     | 2018                 |
| cag cgc tgc gcc atc gcc ctg tgg ttc acg ctg gat cct cgg cac agt<br>Gln Arg Cys Ala Ile Ala Leu Trp Phe Thr Leu Asp Pro Arg His Ser<br>670 675 680 685                                      |     |     | 2066                 |
| gag aga gac agg gtg cag gca gat gac ctg gtg aag atg ctg ttc agc<br>Glu Arg Asp Arg Val Gln Ala Asp Asp Leu Val Lys Met Leu Phe Ser<br>690 695 700  |     |     | 2114                 |
| cca gaa gag gtg gac ctc ccc cag gaa cag ccc ctg cct gac cag cag<br>Pro Glu Glu Val Asp Leu Pro Gln Glu Gln Pro Leu Pro Asp Gln Gln<br>705 710 715  |     |     | 2162                 |
| ggc tgc cca gag cct gga gaa gag ttt ctg cat ggt gct act gtt ctt<br>Gly Ser Pro Glu Pro Gly Glu Glu Phe Leu His Gly Ala Thr Val Leu<br>720 725 730  |     |     | 2210                 |
| gga gtg ggc ata gca gga cac act ctt ctc tgg gct tgg ctg<br>Gly Val Gly Ile Ala Gly His Thr Leu Leu Trp Ala Trp Leu<br>735 740 745  |     |     | 2252                 |
| taggctcaga atgcaggccc agaaccaccc tggggcctat gtaggcagct gccgtcagca<br>gcgtgatata tttaagtgtc tgtaaagaca accaaagaat aaatgatttg tgtttttaa<br>aagnaaaaaa aaaaaaaaaat taaaaatttg cgcggccgca agaa |     |     | 2312<br>2372<br>2416 |

&lt;210&gt; 6

&lt;211&gt; 747

&lt;212&gt; PRT

&lt;213&gt; Mus musculus

&lt;400&gt; 6

|  |  |
|--|--|
| Met Ala Val Thr Lys Gly Gly Cys Trp His Asp Ala Ser Gly Arg Arg<br>1 5 10 15   |  |
| Arg Arg Arg Leu Thr Gly Cys Gly Glu Ser Glu Pro Gly Trp Asp Val<br>20 25 30    |  |
| Ala Ala Pro Asp Leu Leu Tyr Ala Glu Gly Thr Ala Ala Tyr Ser Arg<br>35 40 45    |  |
| Arg Asp Trp Pro Gly Val Val Leu Asn Met Glu Arg Ala Leu Arg Ser<br>50 55 60    |  |
| Arg Ala Ala Leu Arg Ala Leu Arg Leu Arg Cys Arg Thr Arg Cys Ala<br>65 70 75 80 |  |
| Thr Glu Leu Pro Trp Ala Pro Asp Leu Asp Leu Gly Pro Asp Pro Ser<br>85 90 95    |  |
| Leu Ser Gln Asp Pro Gly Ala Ala Ala Leu His Asp Leu Arg Phe Phe                |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     | 100 |     | 105 |     | 110 |     |     |     |     |     |     |     |     |     |     |
| Gly | Ala | Val | Leu | Arg | Arg | Ala | Ala | Cys | Leu | Arg | Arg | Cys | Leu | Gly | Pro |
|     | 115 |     |     |     |     | 120 |     |     |     |     |     | 125 |     |     |     |
| Pro | Ser | Ala | His | Leu | Leu | Ser | Glu | Glu | Leu | Asp | Leu | Glu | Phe | Asn | Lys |
|     | 130 |     |     |     |     | 135 |     |     |     |     |     | 140 |     |     |     |
| Arg | Ser | Pro | Tyr | Asn | Tyr | Leu | Gln | Val | Ala | Tyr | Phe | Lys | Ile | Asn | Lys |
| 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     |     | 160 |
| Leu | Glu | Lys | Ala | Val | Ala | Ala | Ala | His | Thr | Phe | Phe | Val | Gly | Asn | Pro |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Glu | His | Met | Glu | Met | Arg | Gln | Asn | Leu | Asp | Tyr | Tyr | Gln | Thr | Met | Ser |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Gly | Val | Lys | Glu | Ala | Asp | Phe | Arg | Asp | Leu | Glu | Ala | Lys | Pro | His | Met |
|     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| His | Glu | Phe | Arg | Leu | Gly | Val | Arg | Leu | Tyr | Ser | Glu | Glu | Lys | Pro | Gln |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Glu | Ala | Val | Pro | His | Leu | Glu | Ala | Ala | Leu | Gln | Glu | Tyr | Phe | Val | Ala |
| 225 |     |     |     |     | 230 |     |     |     | 235 |     |     |     |     |     | 240 |
| Asp | Glu | Glu | Cys | Arg | Ala | Leu | Cys | Glu | Gly | Pro | Tyr | Asp | Tyr | Asp | Gly |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Tyr | Asn | Tyr | Leu | Asp | Tyr | Ser | Ala | Asp | Leu | Phe | Gln | Ala | Ile | Thr | Asp |
|     | 260 |     |     |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| His | Tyr | Val | Gln | Val | Leu | Asn | Cys | Lys | Gln | Asn | Cys | Val | Thr | Glu | Leu |
|     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |     |
| Ala | Ser | His | Pro | Ser | Arg | Glu | Lys | Pro | Phe | Glu | Asp | Phe | Leu | Pro | Ser |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| His | Tyr | Asn | Tyr | Leu | Gln | Phe | Ala | Tyr | Tyr | Asn | Ile | Gly | Asn | Tyr | Thr |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Gln | Ala | Ile | Glu | Cys | Ala | Lys | Thr | Tyr | Leu | Leu | Phe | Phe | Pro | Asn | Asp |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Glu | Val | Met | His | Gln | Asn | Leu | Ala | Tyr | Tyr | Thr | Ala | Met | Leu | Gly | Glu |
|     | 340 |     |     |     |     |     |     | 345 |     |     |     | 350 |     |     |     |
| Glu | Glu | Ala | Ser | Ser | Ile | Ser | Pro | Arg | Glu | Asn | Ala | Glu | Glu | Tyr | Arg |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Arg | Pro | Asn | Leu | Leu | Glu | Lys | Glu | Leu | Leu | Phe | Phe | Ala | Tyr | Asp | Ile |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Phe | Gly | Ile | Pro | Phe | Val | Asp | Pro | Asp | Ser | Trp | Thr | Pro | Glu | Glu | Val |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Ile | Pro | Lys | Arg | Leu | Gln | Glu | Lys | Gln | Lys | Ser | Glu | Arg | Glu | Thr | Ala |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Val | Arg | Ile | Ser | Gln | Glu | Ile | Gly | Asn | Leu | Met | Lys | Glu | Ile | Glu | Thr |
|     | 420 |     |     |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Leu | Val | Glu | Glu | Lys | Thr | Lys | Glu | Ser | Leu | Asp | Val | Ser | Arg | Leu | Thr |
|     | 435 |     |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Arg | Glu | Gly | Gly | Pro | Leu | Leu | Tyr | Glu | Gly | Ile | Ser | Leu | Thr | Met | Asn |
|     | 450 |     |     |     |     | 455 |     |     |     | 460 |     |     |     |     |     |
| Ser | Lys | Val | Leu | Asn | Gly | Ser | Gln | Arg | Val | Val | Met | Asp | Gly | Val | Ile |
| 465 |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |     |
| Ser | Asp | Asp | Glu | Cys | Gln | Glu | Leu | Gln | Arg | Leu | Thr | Asn | Ala | Ala | Ala |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Thr | Ser | Gly | Asp | Gly | Tyr | Arg | Gly | Gln | Thr | Ser | Pro | His | Thr | Pro | Asn |
|     | 500 |     |     |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Glu | Lys | Phe | Tyr | Gly | Val | Thr | Val | Leu | Lys | Ala | Leu | Lys | Leu | Gly | Gln |
|     | 515 |     |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Glu | Gly | Lys | Val | Pro | Leu | Gln | Ser | Ala | Arg | Met | Tyr | Tyr | Asn | Val | Thr |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Glu | Lys | Val | Arg | Arg | Val | Met | Glu | Ser | Tyr | Phe | Arg | Leu | Asp | Thr | Pro |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |



| 65  | 70 | 75 |     |
|---|----|----|-----|
| cgc tgt gcc acc gaa ctg ccg tgg gca ccg gac ctg gat ctc ggt ccg<br>Arg Cys Ala Thr Glu Leu Pro Trp Ala Pro Asp Leu Asp Leu Gly Pro<br>80 85 90        |    |    | 290 |
| gac ccc agc ctg agc cag gac ccg ggc gcc gcc gcc ctg cac gac ctg<br>Asp Pro Ser Leu Ser Gln Asp Pro Gly Ala Ala Leu His Asp Leu<br>95 100 105          |    |    | 338 |
| cgc ttc ttc gga gcc gtg ctg cgc cgt gcc gcc tgc cta cgc cgc tgc<br>Arg Phe Phe Gly Ala Val Leu Arg Arg Ala Ala Cys Leu Arg Arg Cys<br>110 115 120 125 |    |    | 386 |
| ctc ggg ccg ccc tct gcc cac ttg ctg agt gaa gaa ctg gac ctg gag<br>Leu Gly Pro Pro Ser Ala His Leu Leu Ser Glu Glu Leu Asp Leu Glu<br>130 135 140     |    |    | 434 |
| ttc aac aag cgg agc ccg tac aac tac ctg cag gtc gcc tat ttc aag<br>Phe Asn Lys Arg Ser Pro Tyr Asn Tyr Leu Gln Val Ala Tyr Phe Lys<br>145 150 155     |    |    | 482 |
| ata aac aag ctg gag aaa gct gtg gct gcg gca cac acc ttc ttt gtg<br>Ile Asn Lys Leu Glu Lys Ala Val Ala Ala His Thr Phe Phe Val<br>160 165 170         |    |    | 530 |
| ggc aat cct gag cac atg gag atg cgg cag aac ctc gac tat tac caa<br>Gly Asn Pro Glu His Met Glu Met Arg Gln Asn Leu Asp Tyr Tyr Gln<br>175 180 185     |    |    | 578 |
| acc atg tct ggg gtg aag gag gca gac ttc agg gat ctc gag gcc aag<br>Thr Met Ser Gly Val Lys Glu Ala Asp Phe Arg Asp Leu Glu Ala Lys<br>190 195 200 205 |    |    | 626 |
| ccc cat atg cat gag ttt cgg ctg ggg gta cga ctc tac tca gag gag<br>Pro His Met His Glu Phe Arg Leu Gly Val Arg Leu Tyr Ser Glu Glu<br>210 215 220     |    |    | 674 |
| aag cca cag gaa gct gtg ccc cac ctg gag gcg gca ctg caa gag tac<br>Lys Pro Gln Glu Ala Val Pro His Leu Glu Ala Ala Leu Gln Glu Tyr<br>225 230 235     |    |    | 722 |
| ttt gtg gcc gat gag gag tgc cgt gcc ctc tgc gaa ggg ccc tat gac<br>Phe Val Ala Asp Glu Glu Cys Arg Ala Leu Cys Glu Gly Pro Tyr Asp<br>240 245 250     |    |    | 770 |
| tac gac ggc tac aac tac cta gac tac agc gct gac ctc ttc cag gcc<br>Tyr Asp Gly Tyr Asn Tyr Leu Asp Tyr Ser Ala Asp Leu Phe Gln Ala<br>255 260 265     |    |    | 818 |
| atc aca gat cat tac gtc cag gtc ctc aac tgt aag cag aac tgt gtc<br>Ile Thr Asp His Tyr Val Gln Val Leu Asn Cys Lys Gln Asn Cys Val<br>270 275 280 285 |    |    | 866 |
| acg gag ctg gct tcc cac cca agt agg gaa aag ccc ttt gaa gac ttc<br>Thr Glu Leu Ala Ser His Pro Ser Arg Glu Lys Pro Phe Glu Asp Phe<br>290 295 300     |    |    | 914 |



|   |      |
|---|------|
| ctc cct tca cac tat aat tac cta cag ttt gcc tac tac aac att ggg<br>Leu Pro Ser His Tyr Asn Tyr Leu Gln Phe Ala Tyr Tyr Asn Ile Gly<br>305 310 315     | 962  |
| aac tat aca caa gct att gaa tgt gcc aag acc tac ctc ctc ttc ttt<br>Asn Tyr Thr Gln Ala Ile Glu Cys Ala Lys Thr Tyr Leu Leu Phe Phe<br>320 325 330     | 1010 |
| ccc aat gat gag gtg atg cac cag aat ctg gct tat tac aca gcc atg<br>Pro Asn Asp Glu Val Met His Gln Asn Leu Ala Tyr Tyr Thr Ala Met<br>335 340 345     | 1058 |
| ctt gga gaa gaa gag gcc agc tcc atc agc ccc agg gag aat gcc gag<br>Leu Gly Glu Glu Glu Ala Ser Ser Ile Ser Pro Arg Glu Asn Ala Glu<br>350 355 360 365 | 1106 |
| gaa tac cga cgt cca aac ctg ttg gag aaa gaa ctg ctt ttc ttc gct<br>Glu Tyr Arg Arg Pro Asn Leu Leu Glu Lys Glu Leu Leu Phe Phe Ala<br>370 375 380     | 1154 |
| tat gac att ttt gga att ccc ttt gtg gat ccc gat tca tgg act cca<br>Tyr Asp Ile Phe Gly Ile Pro Phe Val Asp Pro Asp Ser Trp Thr Pro<br>385 390 395     | 1202 |
| gaa gaa gtg att ccc aag aga ttg caa gag aaa cag aag tct gaa cgg<br>Glu Glu Val Ile Pro Lys Arg Leu Gln Glu Lys Gln Lys Ser Glu Arg<br>400 405 410     | 1250 |
| gaa aca gcc gta cgc atc tcc cag gag att ggg aac ctt atg aag gaa<br>Glu Thr Ala Val Arg Ile Ser Gln Glu Ile Gly Asn Leu Met Lys Glu<br>415 420 425     | 1298 |
| atc gag acc ctt gtg gaa gag aag acc aag gag tct ctg gat gtg agc<br>Ile Glu Thr Leu Val Glu Glu Lys Thr Lys Glu Ser Leu Asp Val Ser<br>430 435 440 445 | 1346 |
| aga ctg acc cgg gaa ggt ggt ccc ctg ctg tat gaa ggc atc agt ctc<br>Arg Leu Thr Arg Glu Gly Gly Pro Leu Leu Tyr Glu Gly Ile Ser Leu<br>450 455 460     | 1394 |
| acc atg aac tcc aaa gtc ttg aat ggc tcc cag cgg gtg gtg atg gat<br>Thr Met Asn Ser Lys Val Leu Asn Gly Ser Gln Arg Val Val Met Asp<br>465 470 475     | 1442 |
| ggt gtg atc tct gat gat gag tgc cag gag ctg cag aga ctg acc aat<br>Gly Val Ile Ser Asp Asp Glu Cys Gln Glu Leu Gln Arg Leu Thr Asn<br>480 485 490     | 1490 |
| gcg gca gca act tcg gga gat ggc tac cga ggt cag acc tcc cca cac<br>Ala Ala Ala Thr Ser Gly Asp Gly Tyr Arg Gly Gln Thr Ser Pro His<br>495 500 505     | 1538 |
| acc cca aat gaa aag ttc tat ggt gtt act gtc ctc aaa gct ctc aag<br>Thr Pro Asn Glu Lys Phe Tyr Gly Val Thr Val Leu Lys Ala Leu Lys<br>510 515 520 525 | 1586 |

ctc ggg cag gaa gga aaa gtt cct ctg cag agt gcc cgc acc gca ctg 1634  
 Leu Gly Gln Glu Gly Lys Val Pro Leu Gln Ser Ala Arg Thr Ala Leu  
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 Gln

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           20                  25                  30  
 Ala Ala Pro Asp Leu Leu Tyr Ala Glu Gly Thr Ala Ala Tyr Ser Arg  
           35                  40                  45  
 Arg Asp Trp Pro Gly Val Val Leu Asn Met Glu Arg Ala Leu Arg Ser  
           50                  55                  60  
 Arg Ala Ala Leu Arg Ala Leu Arg Leu Arg Cys Arg Thr Arg Cys Ala  
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 Thr Glu Leu Pro Trp Ala Pro Asp Leu Asp Leu Gly Pro Asp Pro Ser  
           85                  90                  95  
 Leu Ser Gln Asp Pro Gly Ala Ala Ala Leu His Asp Leu Arg Phe Phe  
           100                  105                  110  
 Gly Ala Val Leu Arg Arg Ala Ala Cys Leu Arg Arg Cys Leu Gly Pro  
           115                  120                  125  
 Pro Ser Ala His Leu Leu Ser Glu Glu Leu Asp Leu Glu Phe Asn Lys  
   130                  135                  140  
 Arg Ser Pro Tyr Asn Tyr Leu Gln Val Ala Tyr Phe Lys Ile Asn Lys  
   145                  150                  155                  160  
 Leu Glu Lys Ala Val Ala Ala Ala His Thr Phe Phe Val Gly Asn Pro  
           165                  170                  175  
 Glu His Met Glu Met Arg Gln Asn Leu Asp Tyr Tyr Gln Thr Met Ser  
           180                  185                  190  
 Gly Val Lys Glu Ala Asp Phe Arg Asp Leu Glu Ala Lys Pro His Met  
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 His Glu Phe Arg Leu Gly Val Arg Leu Tyr Ser Glu Glu Lys Pro Gln  
           210                  215                  220  
 Glu Ala Val Pro His Leu Glu Ala Ala Leu Gln Glu Tyr Phe Val Ala  
   225                  230                  235                  240  
 Asp Glu Glu Cys Arg Ala Leu Cys Glu Gly Pro Tyr Asp Tyr Asp Gly

|                 |   |                             |     |     |     |
|-----------------|---|-----------------------------|-----|-----|-----|
|                 | 245   |                             | 250 |     | 255 |
| Tyr Asn Tyr     | Leu Asp Tyr Ser Ala Asp                             | Leu Phe Gln Ala Ile Thr Asp |     |     |     |
|                 | 260   | 265                         |     | 270 |     |
| His Tyr Val     | Gln Val Leu Asn Cys Lys Gln Asn Cys Val Thr Glu Leu |                             |     |     |     |
|                 | 275   | 280                         |     | 285 |     |
| Ala Ser His     | Pro Ser Arg Glu Lys Pro Phe Glu Asp Phe Leu Pro Ser |                             |     |     |     |
|                 | 290   | 295                         |     | 300 |     |
| His Tyr Asn Tyr | Leu Gln Phe Ala Tyr Tyr Asn Ile Gly Asn Tyr Thr     |                             |     |     |     |
| 305             | 310   |                             | 315 |     | 320 |
| Gln Ala Ile     | Glu Cys Ala Lys Thr Tyr Leu Leu Phe Phe Pro Asn Asp |                             |     |     |     |
|                 | 325   | 330                         |     | 335 |     |
| Glu Val Met     | His Gln Asn Leu Ala Tyr Tyr Thr Ala Met Leu Gly Glu |                             |     |     |     |
|                 | 340   | 345                         |     | 350 |     |
| Glu Glu Ala     | Ser Ser Ile Ser Pro Arg Glu Asn Ala Glu Glu Tyr Arg |                             |     |     |     |
|                 | 355   | 360                         |     | 365 |     |
| Arg Pro Asn     | Leu Leu Glu Lys Glu Leu Leu Phe Phe Ala Tyr Asp Ile |                             |     |     |     |
|                 | 370   | 375                         |     | 380 |     |
| Phe Gly Ile     | Pro Phe Val Asp Pro Asp Ser Trp Thr Pro Glu Glu Val |                             |     |     |     |
| 385             | 390   |                             | 395 |     | 400 |
| Ile Pro Lys     | Arg Leu Gln Glu Lys Gln Lys Ser Glu Arg Glu Thr Ala |                             |     |     |     |
|                 | 405   | 410                         |     | 415 |     |
| Val Arg Ile     | Ser Gln Glu Ile Gly Asn Leu Met Lys Glu Ile Glu Thr |                             |     |     |     |
|                 | 420   | 425                         |     | 430 |     |
| Leu Val Glu     | Lys Thr Lys Glu Ser Leu Asp Val Ser Arg Leu Thr     |                             |     |     |     |
|                 | 435   | 440                         |     | 445 |     |
| Arg Glu Gly     | Gly Pro Leu Leu Tyr Glu Gly Ile Ser Leu Thr Met Asn |                             |     |     |     |
|                 | 450   | 455                         |     | 460 |     |
| Ser Lys Val     | Leu Asn Gly Ser Gln Arg Val Val Met Asp Gly Val Ile |                             |     |     |     |
| 465             | 470   |                             | 475 |     | 480 |
| Ser Asp Asp     | Glu Cys Gln Glu Leu Gln Arg Leu Thr Asn Ala Ala Ala |                             |     |     |     |
|                 | 485   | 490                         |     | 495 |     |
| Thr Ser Gly     | Asp Gly Tyr Arg Gly Gln Thr Ser Pro His Thr Pro Asn |                             |     |     |     |
|                 | 500   | 505                         |     | 510 |     |
| Glu Lys Phe     | Tyr Gly Val Thr Val Leu Lys Ala Leu Lys Leu Gly Gln |                             |     |     |     |
|                 | 515   | 520                         |     | 525 |     |
| Glu Gly Lys     | Val Pro Leu Gln Ser Ala Arg Thr Ala Leu Gln         |                             |     |     |     |
|                 | 530   | 535                         |     | 540 |     |

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&lt;211&gt; 28

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Artificially Synthesized Primer Sequence

&lt;400&gt; 9

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28

&lt;210&gt; 10

&lt;211&gt; 21

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Artificially Synthesized Primer Sequence

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|--|----|
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